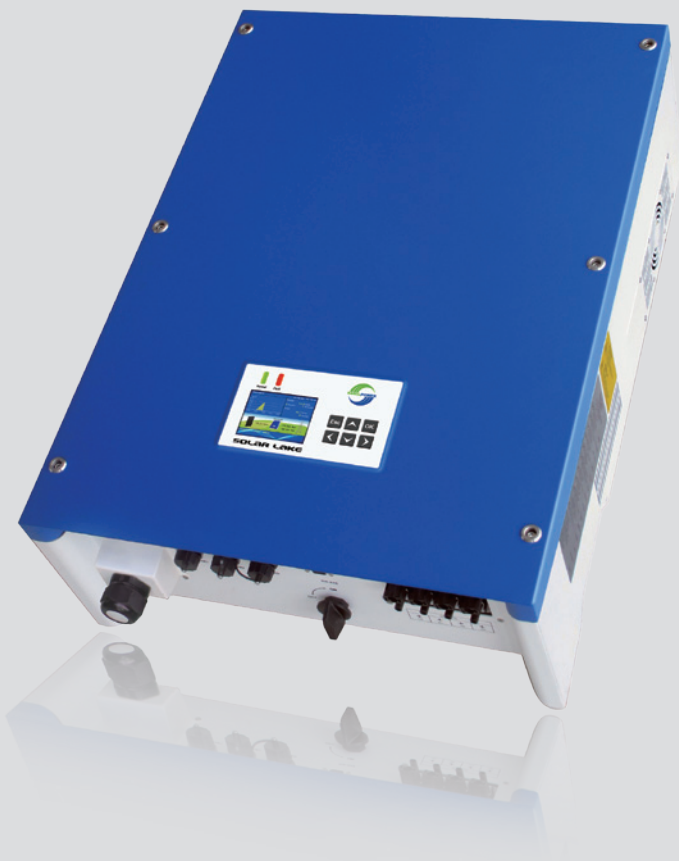# SAMIL POWER

™

Expert for PV Grid-tied Inverters

SolarLake PV Grid-tied Inverter
Product Manual
SP–SL–V5.1–EN

English

Copyright Declaration

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Samil Power reserves the right of final interpretation. This manual is subject to change according to user's or customer's feedback. Please check our website at www.samilpower.com for latest version.

Contents

- **Notes on This Manual**

  This manual is an integral part of the inverter. Please read the product manual carefully before installation, operation or maintenance. Keep this product manual for future reference. Please note that all pictures are edited by Samil Power.

- **Scope of Validity**

  This product manual describes the assembly, installation, commissioning, and maintenance of the following Samil Power SolarLake Series inverters.

SolarLake 10000TL	**SolarLake 12000TL**
SolarLake 15000TL	**SolarLake 17000TL**

  Keep this manual where it will be accessible at all times.

- **Target Group**

  This manual is for qualified person (support person, service person are qualified mentioned in this manual). The tasks described in this manual must only be performed by qualified person.

- **Symbols Used**

  This manual provides safety operation information and uses the symbol in order to ensure personal and property security and use the inverter efficiently when operating the inverter. You must understand and absolute these emphasize information to avoid the personal injury and property loss. Please read the following symbols which used in this manual carefully.

  Danger

  Danger indicates a hazardous situation which. if not avoided, will result in death or serious injury.

  Warning

  Warning indicates a hazardous situation which, if not avoided, could result in death or serious injury.

  Caution

  Caution indicates a hazardous situation, if not avoided, could result in minor or moderate injury.

  Note

  Note provides tips that are valuable for the optimal operation of user product.
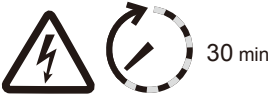
  Attention

  Attention indicates there are potential risks, if fail to prevent may lead to equipment cannot run normally or property damage.

- **Symbols on the Inverter**

  There are some symbols which are related to issue of security. Please first read and fully understand the content of the symbols, and then install equipment.

Symbol	Explaination
⚡ ⏱ 30 min	There is residual voltage in the inverter! Ensure that AC/DC side are not charged before installation and maintenance. But when inverter DC side disconnect for a period of time, capacitance still charge, so wait for 30 minutes to ensure the capacitance discharge.
⚡	Be careful of high voltage.
♨	Be careful of high temperature.
CE	Symbol of CE: Inverter is accord with CE safety certification standard.

If cause some kinds of property destruction and personal injury without according to the instructions of this manual. Samil Power Co., Ltd does not take any responsibility for that.

1 Basic safety information

Note

If you have any questions or problems when you read the following information, please contact Samil Power Co., Ltd.

1.1 Preface

Installation of SolarLake invertermust be completely accord with national and local power grid standards and regulations.

- Please contact recently authorized repair center if you need any maintenance or repairs. If you want to know the information of authorized center, please contact your dealer. Please don't maintenance by yourself or it could cause property destruction and personal injury.

- Read and understand the instruction of this manual ,and be familiar with relevant safety symbols in the paragraph， then start to install and debug the equipment.

- According to the national and state requirements, before connect the grid, you must get power department permission, and perform the operation only by qualified electrical engineer.

- Before installing and maintaining the equipment, you should cut off the high voltage application of PV array. You can also open the switch of SolarArray Combiner to cut off the high voltage. Otherwise, serious injury may be caused.

1.2 General information

Some parts are electrically charged and some parts are scalding when the inverter is working. Some kinds of property destruction and personal injury will be caused if unauthorized improper use or wrong install, wrong operate. The inverter must be transported, loaded, installed and maintained by qualified electrical engineer(must abide by the effective accident prevention rules of users' country!)

According to the basic safety rules, qualified electrical engineer should have the ability of assembling, starting and operating the product and have necessary conditions and qualifications of performing.

Samil Power Co., Ltd does not take any responsibility for the property destruction and personal injury because of any incorrect use.

1.3 Safety instruction

Danger
Danger to life due to high voltages in the inverter!
- All work on the inverter must be carried out by qualified person only；
- The appliance used by children or persons with reduced physical sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction；
- Children should be supervised to ensure that they do not play with the appliance.

Caution
Danger of burn injuries due to hot enclosure parts!
- During working only can touch the display and key parts of inverter.

⚠️ **Attention**
PV array should be connected to the ground in accordance with requirements of local power department
To protect system and the personnel security, we suggest that PV array of border and inverter should be reliable grounding.

⚠️ **Warning**
Ensure input DC voltage ≤ Max.DC voltage .Over voltage may cause permanent damage to inverter or other losses, which will not be included in warranty!

⚠️ **Advertencia**
Disconnect both AC and DC power from the inverter before opening the machine shell and maintaining only by professional electrical engineer.

1.4 Assembly

Please install and start SolarLake inverter according to the following sections. Put the inverter in appropriate bearing capacity objects (such as wall and components and so on), to ensure that inverter vertical placed. Choose suitable place for installing electrical equipment. And assure enough fire exit space, convenience for maintenance. Maintain proper ventilation, and ensure that have the enough air cooling cycle.

1.5 Transport

In our factory test center, we has strictly tested and inspected on SolarLake inverter to ensure the high quality of our products. The product has been in a best electrical, mechanical state. Our product is special packed to ensure that inverter is not damage because of transportation. However, transports accident could still happen. The transportation company is responsible for damage.

When take delivery of the goods, please check inverter. If you find packing problems that may cause the damage of the inverter, or find any visible damage, please immediately notice the responsible transportation company. You can ask solar equipment installation contractor or Samil Power Co., Ltd for help if necessary.

Must use original package or appropriate package when transportation inverter, to ensure the equipment transported safely.

1.6 Electric connection

Please comply with all the current electrical regulations about accident prevented in dealing with the current inverter.

⚠️ **Danger**
Before the electrical connection, make sure to use opaque material to cover the PV battery or disconnected PV panels DC switch. Exposure to the sun, PV array will produce a dangerous voltage.

Warning

All installation accomplished only by professional electrical engineer.

- Must be trained;
- Completely read the manual operation and understand relevant matters.

Attention

Only get permission by the local power department and complete all electrical connection by professional electrical engineer then connect inverter into grid.

1.7 Operation

Attention

Some internal components will be fever when inverter is working. Please wear protective gloves.

Danger

Touching the power grid or the terminal of equipment may lead to die of electric shock or fire.

- Don't touch the terminal or conductor which connect to the power
- circuit.
  Pay attention to anything about grid connection and security document.

1.8 Maintenance and repair

Danger

- Disconnected with the PV components array and electricity grid before any repair work.
After turn off AC breaker and DC switch for 5 minutes later, the maintenance or repair of the inverter can be carried out.

Attention

Inverter should work again after removing any faults. If you need any repair work, please contact with the local authorized service center.

Attention

Can't dismounting the internal components of inverter without authorized. Samil Power Co., Ltd does not take any responsibility for the losses from that.

1.9 EMC / noise level of inverter

Electromagnetic compatibility (EMC) refers to that one electrical equipment functions in a given electromagnetic environment without any trouble or error, and impose no unacceptable effect upon the environment. Therefore, EMC represents the quality characters of electrical equipment

- The inherent noise-immune character: immunity to internal electrical noise Panel Invert
- External noise immunity: immunity to electromagnetic noise in external system
- Noise emission level: influence of electromagnetic emission upon environment.

> ⚠ **Warning**
> Electromagnetic radiation from inverter may be harmful to health.
> - Please do not continue to stay away from the inverter in less than 20 cm when inverter is working.

2 Product description

2.1 Function

The SolarLake Series is a PV inverter which converts the DC current of a PV generator into AC current and feeds it into the public grid.

PV Modules   Grid-tied Inverter   Grid
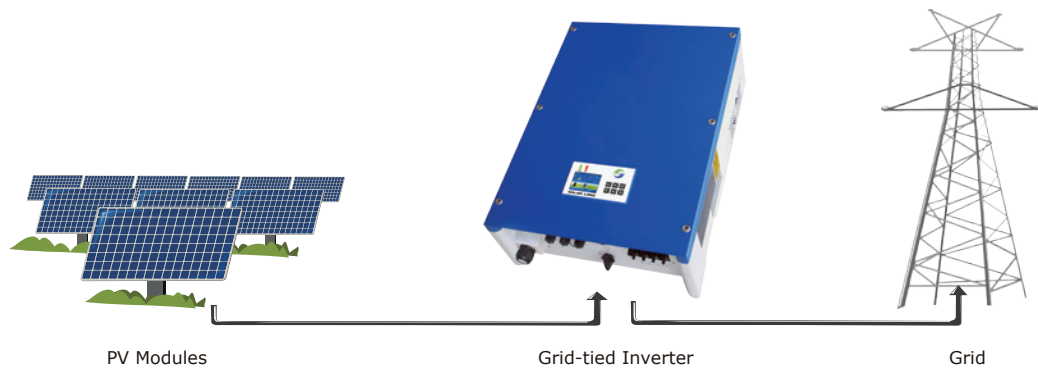
Figure 1 PV Grid-tied System

Manufacturing SolarLake inverter uses the latest technology, and strictly observe well recognized safety procedures. Even so, misoperation will cause property destruction and personal injury.

Inverter must be reliably connected to utility power grid when working. The inverter is not designed for mobile application.

The inverter was not used in any other or additional purposes. The manufacturer/supplier does not take any responsibility for that. For purpose, must strictly abide by these relevant specifications of the manual.

2.2 Electrical block diagram

- **Electrical block diagram**

SolarLake inverter internal function module diagram is presented in figure 2. The DC power which generate from PV components array is filtered through Input Board .Before enter into inverter DC voltage is increased by Boost Board. Functions of Input Board are insulation impedance detection, auxiliary power and input DC voltage / current detection. Internal MPP tracker of inverter insure inverter producing max power. DC power is changed into AC power by Inverter Board full-bridge circuit. Control Board provides the control mode and monitors running state of inverter by LCD Board. LCD Board displays fault information in normal running conditions. ControlBoard also can trigger Output Board internal relay so as

to protect the internal components, Except that, ControlBoard has the functions of residual current detection, output DC voltage / current detection and EMC function.
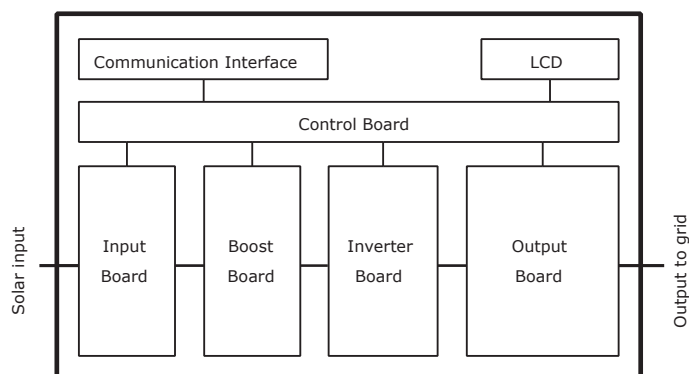
Figure 2 Electrical block diagram(DC switch optional)

● **Terminals of PV inverter**
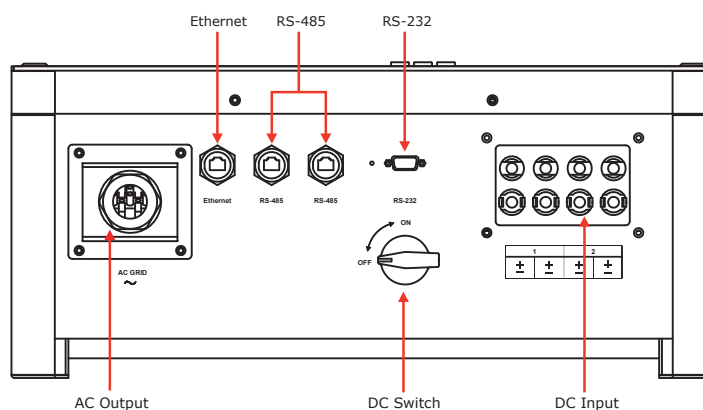
Figure 3 Terminals of PV inverter for 10 KW~17 KW(DC switch is optional)

Note:
For safety reasons, the use of a DC switch is recommended between the PV modules and the power modules. Customers can select Samil Power SolarLake series inverters according to application requirements. DC switch is built in SolarLake inverter.

2.3 Dimension

● **Dimension for SolarLake 10000TL, SolarLake 12000TL, SolarLake 15000TL and SolarLake 17000TL**

716mm

520mm   230mm
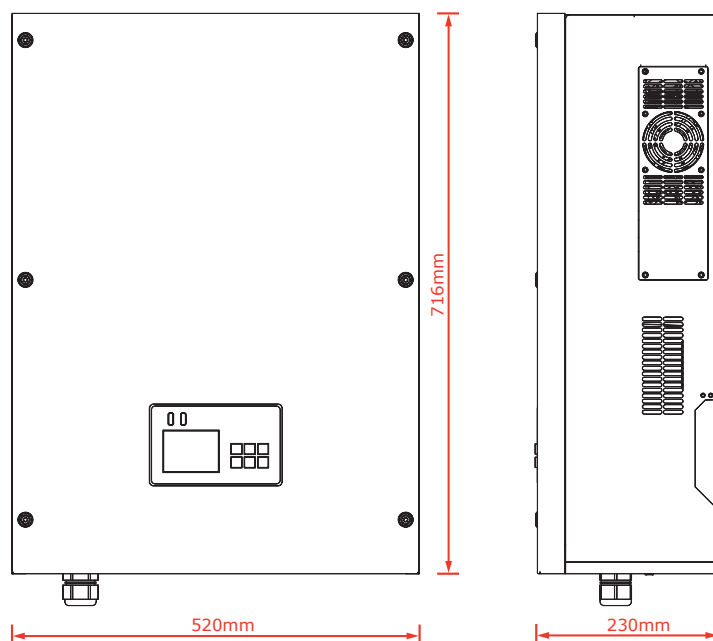
Figure 4 Overview of the inverters dimension

Note:

The AC output terminal is most length part at the bottom of inverter, so take care of the AC output terminals. Do not make it stand on the ground or other materials while moving or lifting the inverters, otherwise it will be damaged.

2.4 Product label

The product label provides basic information of the inverter，which is attached to the right side of the inverter. Pay special attention to the type of inverter and other specifications.

	SolarLake 10000TL	SolarLake 12000TL	SolarLake 15000TL	SolarLake 17000TL
PV Netz-Wechselrichter / PV Grid Inverter				
DC Maximum d.c. input voltage	1000V	1000V	1000V	1000V
DC Operating voltage range	250 - 950V	250 - 950V	250 - 950V	250 - 950V
DC MPP voltage range	320 - 800V	380 - 800V	380 - 800V	430 - 800V
DC Nominal operating voltage	650V	650V	650V	650V
DC Max. input current	2*16A	2*16A	2*20A	2*20A
DC Maximum total PV array short circuit current	2*18A	2*18A	2*22A	2*22A
AC Nominal operating voltage	3*400 V	3*400 V	3*400 V	3*400 V
AC Max. output current	3*16A	3*19.2A	3*24A	3*25A
AC Nominal operating frequency	50Hz	50Hz	50Hz	50Hz
AC Nominal output power	10000W	12000W	15000W	17000W
AC Max.output power	10000W	12000W	15000W	17000W
Ingress protection	IP65	IP65	IP65	IP65
Operating temperature range	-20~+60°C	-20~+60°C	-20~+60°C	-20~+60°C
Protective class	Class Ⅰ	Class Ⅰ	Class Ⅰ	Class Ⅰ

SolarLake 10000TL   SolarLake 12000TL   SolarLake 15000TL   SolarLake 17000TL

Figure 5 Labels for SolarLake10000TL,SolarLake12000TL,SolarLake 15000TL and SolarLake 17000TL(From left to right)

3　Protect device

3.1　Power off

Inverters will be disconnected physically in safe condition when the local power goes off or the equipment is maintained to protect the person working on the power grid. It is correspond with current national standards and regulations. SolarLake inverter is equipped with automatic disconnected protection system to avoid any possible island operation.

> ⚠ **Attention**
>
> If want to know more details or possible reasons for malfunction of equipment, please refer to part 8 of manual.

3.2　Strengthen the protection device

SolarLake inverter equipped with additional protection device to ensure that operate safely in any case safety .These protection include:

√ Continue to monitor the voltage of grid to keep voltage and frequency in a limit range (according to relevant countries and regions grid standard);

√ Limit the power automaticallybased on the internal temperatureso as not to overheating

√ Automatically measurement:

- Measure DC voltage of PV array;
- Measure the three-phase frequency of gird;
- Measure the temperature of equipment
- Measure input/output current of equipment
- Measure output power of equipment.

4　Installation

4.1　Installation process

- Ready to install（refer to 4.2、4.3、4.4、4.5）
Complete the preparation before installation:
  - √ Read the user manual carefully;
  - √ Check the products and parts;
  - √ Inspection installation tools;
  - √ Checkthe installation environment.

- Mechanical installation（refer to 4.6）
Work during mechanical installation:
  - √ Fix the panel of inverter;
  - √ Install inverter.

- Electrical connection（refer to 4.7）
Work during electrical connection:
  - √ Connect DC side;
  - √ Connect AC side;
  - √ Ground joint;
  - √ Connect line of communication.

- Safety inspection（refer to 4.8）
Work during safety inspection:
  - √ Inspect PV array;
  - √ Inspect AC side;
  - √ Inspect DC side;
  - √ Inspect the line of grounding, communication and accessory connection.

4.2 Packaging list

Please check the package list, find out all these in the package. The product on the list are forinstallation. If find some damage or some missing, please contact Samil Power's sales.Figure6 is the packing list
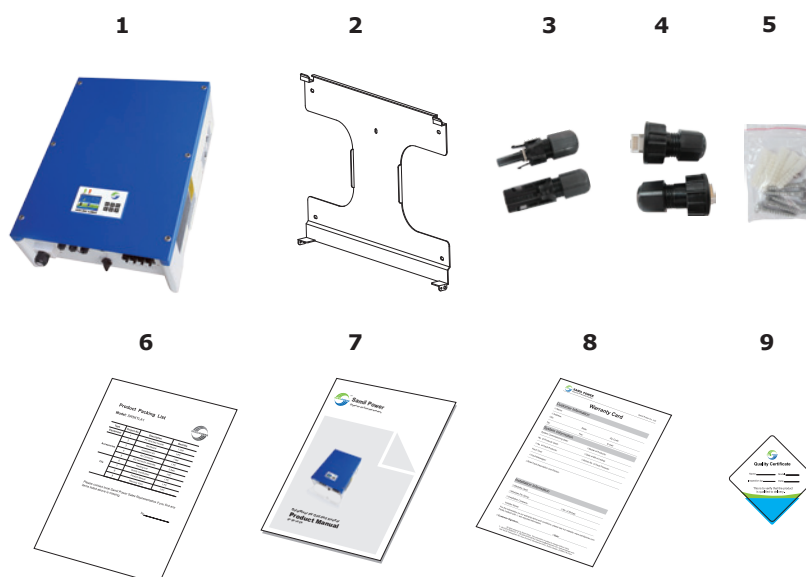
Figure 6 Packaging list

Table 1 Packing list

	Description	QTY	Remark
1	SolarLake inverter	1	
2	Back panel	1	Screw package: 2 M4 screws, 5 ø6 screws, 5 expansion screws
3	Input DC connector	4	
4	RJ45	3	
5	Screw package	1	
6	Packing list	1	
7	Product manual	1	
8	Warranty card	1	
9	Quality certificate	1	

4.3 Safety instruction

> ⚠ **Danger**
> DC voltage can be as much as 1000 V, three-phase AC voltage reaches up to 400 V. Ensure AC/DC side uncharged before installing and maintaining the inverter.

Must strictly observe the following standard and specifications when installing, operating and maintaining SolarLake inverter.

① Get the permission from the local power department then combine inverter to the grid and operate by the professional electrical engineer.

② All the electrical installation must comply with local electrical installation standard.

③ Don't touch the other parts except terminals When installing.

④ There is high electrical voltage when working. Must cut off inverter AC/DC power and external control power and wait for at least 5 minutes before maintaining

⑤ Pay attention to surface heat of inverter. For example, the power Semiconductor Devices still keep higher temperature after blackout a period of time.

> ⚠ Warning：Pay attention to the rated voltage and current when design the system.
> Please assess the following factors when designing PV system:
> The largest input voltage of MPPT circuit in any case(refer to technical features);
> The largest input current of MPPT circuit in any case(refer to technical features).

4.4 Installation precaution

Checking environment where system is installed:

SamilPower suggests customer checking the installation site. Do not fall into any of the following conditions:

- The ambient temperature is outthe range of -20°C to +60°C (Power derating at 45°C).
- Higher than the altitude of about 2,000 m above sea level.
- Prone to be damaged by sea water.
- Close to corrosive gas or liquid (for example, locations where chemicals are processed or the location where feed lots of poultry).
- Exposed to direct sunlight.
- Prone to be flooded or high levels of snow pack.
- Little or no air flow and high humidity.
- Exposed to steam, vapor, or water.
- Exposed to direct cool air.
- Near the television antenna or antenna cable.

Fault because of the above case is not in the scope of warranty.

SamilPower assures the product guarantee of the SolarLake series inverters during five years after your purchase. If the installation site does not meet the instructions described in this manual, it is out of warranty. The warranty is limited to the costs of repair and/or replacement of the product by SamilPower only.

Ventilation is very important to cool the inverter. For outdoors application, the inverter requires at least 50 cm (see table 2) of clearance among the other units and ground. It is recommended that the same clearance(50cm). Installing the inverter in the place mentioned above may cause the malfunction of the system caused by water or high temperature inside the inverter. Please note that it is out of warranty.
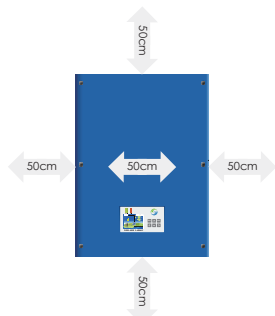
Figure 7 Space specification

Position	Min. Size
Side	50cm
Top	50cm
Bottom	50cm
Front	50cm

Table 2 Available Space Size

4.5 Preparation

Below tools are needed before installation.

Figure 8 Installation Tools

Installation Tools: crimping pliers for binding post and RJ45, screw drivers and manual wrench and φ 8 driller, rubber hammer.

4.6 Installation Steps

Step1: Drill holes in the wall with φ 8 driller according to the size of bracket. Keep drilling vertical to the wall, and don't shake when drilling to avoid damage to the wall. It need repositioning and drilling holes if the hole with much error. Then put expansion pipe into the hole vertically, use rubber hammer to tap the pipe into the wall completely. After that, 5 screws should be twisted into pipes with bracket. See step 1.

Step 1   Step 2

Step 3   Step 4
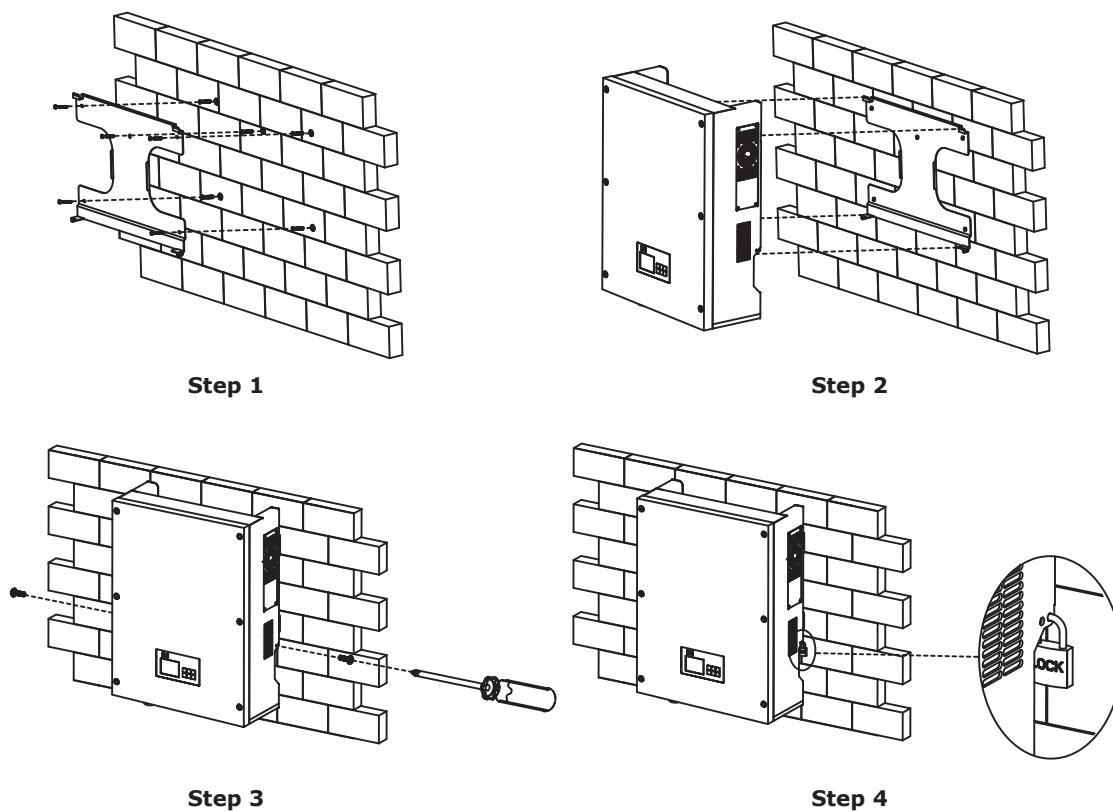
Figure 9 Bracket Installation

Step2: Use the bracket to install the inverter onto the narrow vertical panel (or wall). Make upper corner part of inverter hanging onto the bracket. Lower part match the standard of the bracket. See step 2.

Step3: Make sure the bracket and the inverter side screw holes in a line and matching well. Put the screw(there are left and right 2 screws) into the hole and drive into the inverter tightly. See step 3.

Step4: Lock the inverter and the bracket with lock for safety consideration. (This is optional for users. User can select the lock according to your requirements). See step 4.

4.7 Connections of the PV power system

4.7.1 Announcements

⚠ **Warning**

Ensure that the DC side is not charged before installation and maintenance. But after DC side discharge for a period of time, the capacitor is still charged, so need to wait for 5 minutes to ensure that the capacitors is discharged.

⚠ **Attention**

Only professional electrical engineer can install the inverter.

● **PV String input connection**

⚠ **Danger**

Before the electrical connection, make sure to use opaque material to cover the PV battery or disconnected PV panels DC side of. Exposure to the sun, PV array will produce a dangerous voltage.

☞ **Note**

There are 2 independent MPP trackers in inverter.PV arrays connected to one MPP tracker should be a unified structure, including the same specification, the same number and the same angle.

4.7.2 PV array connection types

PV array connection types: There are 2 independent MPP trackers in inverter. We can choose common-string input connection and multi-strings input connection. We recommend that choose multi-strings connections to harvest max. PV power.
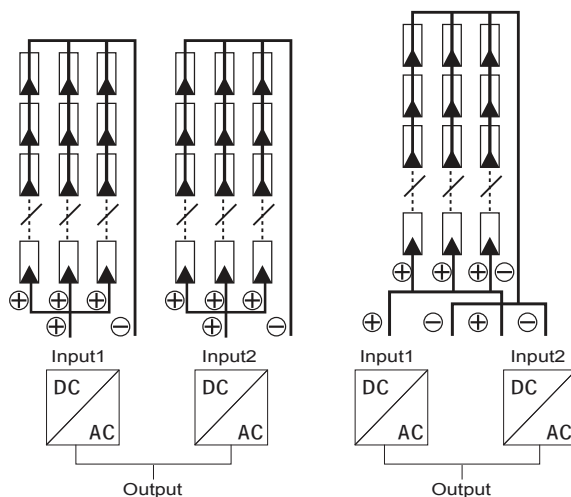
Figure 10 Multi-string input connection (Left) and common-string input connection (Right)

Note:

Make sure the right setting (PV string connection setting) via LCD commissioning steps according to your PV string input connection. Please refer to part5.3 and part 6.2 for details.

Please select PV modules with excellent function and reliable quality. Open-circuit voltage of module arrays connected in series should be <Max. input DC input voltage. Operating voltage should be conformed to MPPT voltage range.

Table 3 DC Voltage Limitation

Model	SolarLake 10000TL	SolarLake 12000TL	SolarLake 15000TL	SolarLake 17000TL
MPPTvoltage range	320~800 Vdc	380~800 Vdc	380~800 Vdc	430~800 Vdc
Max.DC voltage	1000 Vdc			

Please use PV cable to connect modules to inverter. From junction box(Must have fuse spec.:1000V, 25A fast action) to inverter, voltage drop is about 1-2%. So we suggest the inverter install near PV module, in order to save cable and reduce DC loss.

> **Note**
>
> Please don't connect the PV panel positive or negative to ground. And do not apply for thin film panel.

4.7.3 Assembly steps of DC connector

4.7.3.1 Steps of create DC connector

Step 1：Loosing the screw as following figure.
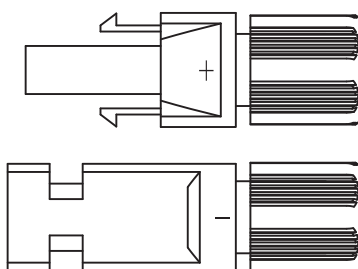
Step 2: Stripped of the DC insulating layer about 8mm, and then connect the bare wire core into core tube of connectors.

Step 3: Insert the cable with the tube core into the fastening nut.

Step 4: Insertthe core tube into slot of connection until hear the voice indicating in place.

Step 5: Tight nuts according to the opposite direction. Now wiring is finished.
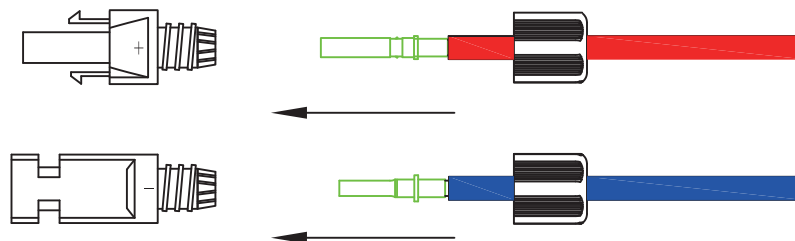
4.7.3.2 Electrical connections of DC side

Steps of connections:

Step 1: Equip the breaker or SolarArray Combiner with lighting protection in DC side.

Step 2: Disconnect the breaker or disconnect SolarArray Combiner with SolarLake inverter.

Step 3: Open-circuit voltage of module arrays connected in series<1000V.

Step 4: Connect the positive and negative connector into the terminals on the bottom of inverter.
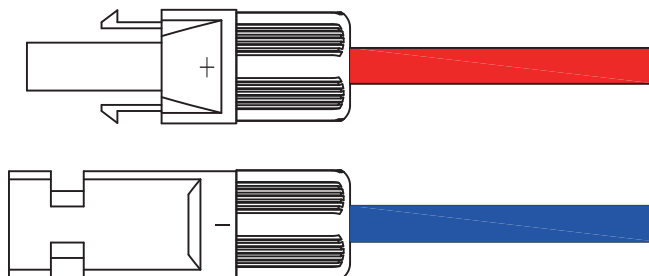
Step 5: Connect the other input in the same way.
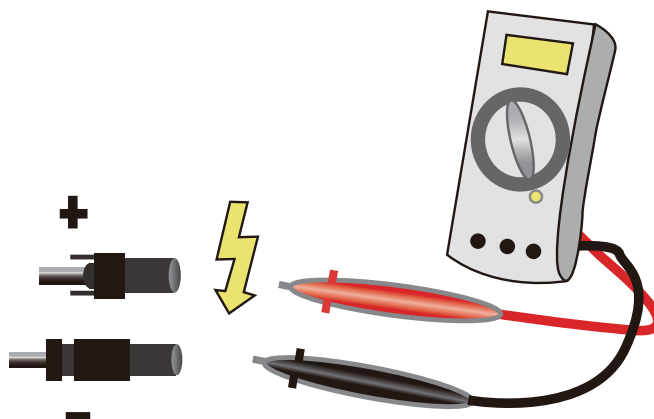
Figure 11 Usemultimeter to measure module array voltage

Note:

There are 4 terminals in the bottom of inverter. Left two are DC input terminals of PV1. Right two are DC input terminals of PV2. Grounding of PV1 and PV2 can not be connected together or it will report the fault information. Check the PV+ and PV- from the PV string combiner box correctly. Make sure PV+ and PV- are connected correctly.

⚠ **Warning**

PV module voltage is very high which belongs to dangerous voltage range. Please comply with electric safety rules when connecting.
When there is something wrong with module arrays, modules can be connected with PV grid-tied inverter only after eliminating these problems.

4.7.4 Assembly steps of AC connector

SolarLake series inverters are designed for three phases grid. Phase voltage is 230±20%, according to requirements of different countries. Typical frequency is 50Hz. Other technical requests should comply with the requirement of local public grid. Below figure 12-14 is the AC output area (terminal block) and 5 wires of cable installation method introduction.
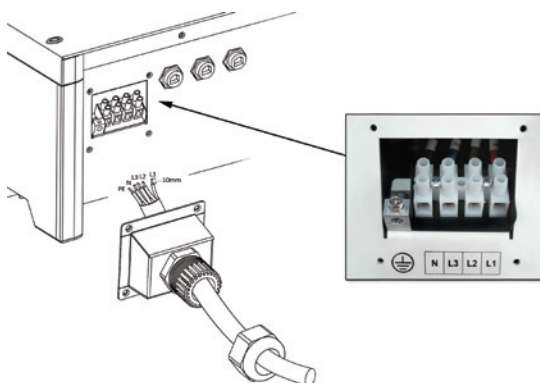
Figure 12 AC output area with terminal block for 5 wires of cable

Below is the AC cable specification table when select the cable for installation.

Table 4 Cable and Micro-breaker Requirement

Model	SolarLake 10000TL	SolarLake 12000TL	SolarLake 15000TL	SolarLake 17000TL
Cable (Cu)	≥4mm²	≥4mm²	≥6mm²	≥6mm²
Micro-Breaker	25A	25A	32A	32A

Note:

For safety reasons, make sure you select the correct specification cables for installation. Otherwise the power will make the cable hot and overload. It could result in death or serious injury.

Below are the steps for AC output wiring.

Step 1：Get out of the four screws at four corners of the AC cover, get off the cover.

Step 2：There are 5 white terminals, which are PE, N, L3(T), L2(S), L1(R). Put the 5 wire of AC cable through the house tunnel, then put the wire into the terminals correctly(make sure the phase sequence is correctly connected）.

Step 3：After 5 wires are connected with terminals please check the wire is in right location.(L wire is connected with L terminal)

Step 4：Put the terminal house on the terminals, get four screws on.
RCMU breaker should be installed between inverter and grid, and its rated fault current: 100 mA≤Ifn≤300 Ma, 0.1S. Any load should not be connected with inverter directly.
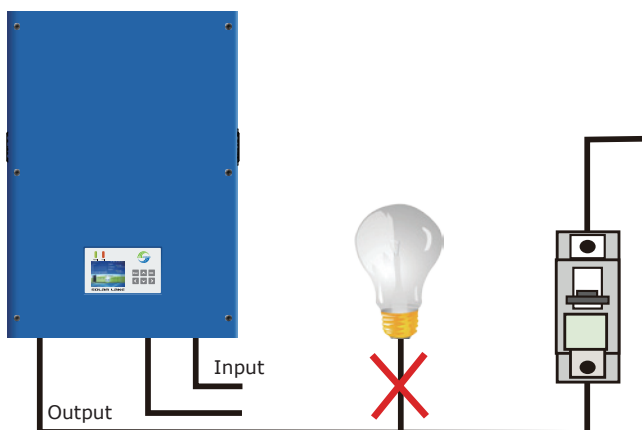
Figure 13 Incorrect Connections between Load and Inverter

Impedance of SolarLake inverter AC connecting dot should be less than 2Ω. To ensure reliable anti-islanding function , PV cable should be used to ensure wire loss ＜1% than normal power. Moreover, length between AC side and grid connecting dot should be less than 150m. Below chart is cable length, section area and wire loss.
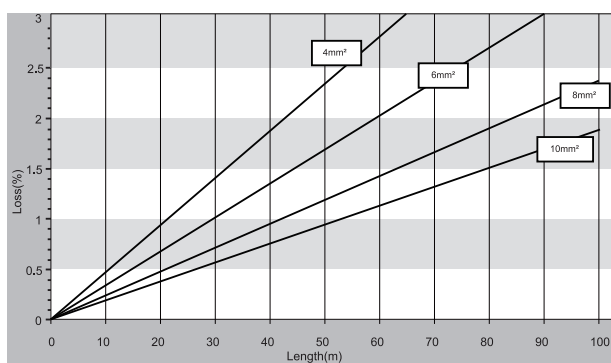
Figure 14 AC Cable Loss

4.7.5 Grounding

Attention

Neither positive nor negative could grounding because of no transformer, or it will break down.

In the system, all non-current-carrying metal parts (such as shell of combiner, distribution and inverter) should be connected to the earth.
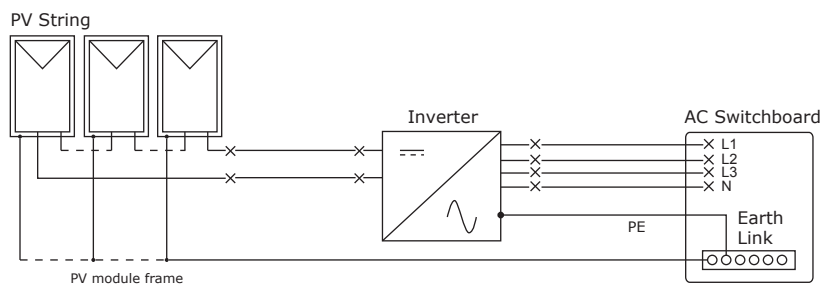
Figure 15 Grounding of syste

- **Connection of communication**

    Please refer to part 7.2.2

4.8 Safety inspection

PV array
Inspect the PV array to determine whether each PV array opening voltage meets the standardbefore operating the inverter.
   – Record all the measurement accurately;
   – Ensure positive and negative polarity correct.

Collection of inverter DC side
Confirm DC side no voltages and currents by multimeter.
Check the wiring of DC side. Look out for the wiring of polarity, and be consistent with PV array. Measure each DC input voltage (open). Ensure that polarity is correct. Check voltage bias (in stable weather). If the bias is more than 3%, may be the problem of PV array.

Collection of inverter AC side
Ensure that the breaker of inverter AC side is "OFF". Check whether the inverter is connected to the grid correctly and check whether the voltage of each phase is at a predetermined range. Measure THD (total harmonic distortion) possibly, then check the curve. If it is distorted seriously, the inverter may not run.

5   Run the inverter

5.1   Inspect the cable

> **Attention**
>
> Inspect all operations, especially inspect whether DC voltage and AC voltage is in accordance with the range permitted by the inverter.

- **Check grid collection of AC side**
Check whether the breaker of user's AC side is disconnected;
SolarLake inverter AC side is three-phase which supplying 400V to grid. Check whether inverter is connected to grid correctly (TN-C, TN-S or TT) and check the collection of PE, N, L3(T), L2(S), L1(R) is ok.

- **Check collection of DC input**
Check whether the switch of DC side is "OFF".
AC current source connected to inverter by the main DC cable, Voltage of each main cable should almost be same and can't exceed the maximum DC voltage of inverter. In addition to voltage inspection, also have to check each main cable polarity. Error of polarity of main cable may damage to the SolarLake inverter. Please check all DC collection again and make sure they are connected firmly.

5.2 Start inverter

Step 1: Turn on DC switch.

Step 2: If it's the first starting the inverter, please check country setting and PV array connection type accords to part 5.3.（The default setting of PV array connection type: Multi-string input connection）

Step 3: Turn on AC breaker;

When the solar arrays generate enough power, inverter will startupautomatically.LCD show "normal" state which indicates that inverter startup success. If the LCD standard interface shows"permanent", press key"ESC" to main menu, press down arrow key to "Event list", then press "OK", if there is "inv 44" fault, it indicates that phase sequence of AC grid is wrong. You should take following measures:

1. Turn off AC breaker and DC switch.
2. Wait for 5 minutes.
3. Exchange the L1 and L2 lines in AC terminals.
4. Turn on AC breakers and DC switch.

If the invertershows other fault, please refer to part 8--error table.

> **Note**
>
> If the inverter fail, please refer to part 8 --error table.

5.3 Check country setting and PV array connection type

Safety has been set corresponding of provisions of the country in the factory and PV array connection type is set to multi-string. Checking whether these two settings are correct by following steps.

5.3.1 Check grid-tied country setting

Enter standard interface automatically after startup (If not the standard interface, press "ESC" return to the standard interface), as shown in figure 16.
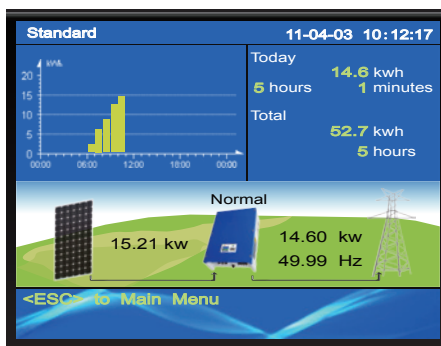
Figure 16 Standard interface

In the standard interface press "ESC" button then enter the main menu, as shown in figure 17.
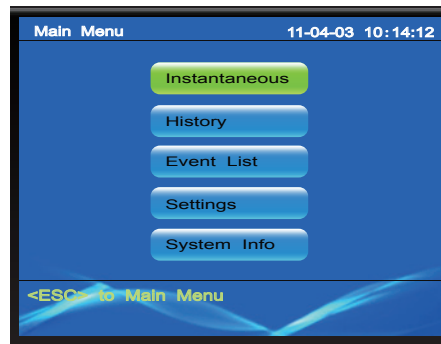
Figure 17 Main menu

Press the down arrow key to move the cursor to the" Settings" and then press "OK" key to enter setup interface, as shown in figure 18.

Figure 18 Setup interface

Press the down arrow key to move the cursor to the" Country", then press "OK" key to enter the local country setting interface, as shown in figure 19.

Figure 19 Local country setting interface

Check whether the settings of local country is correct. If it is correct, press "ESC" to enter standard interface.

If it is not correct, press the up, down, left or right arrow key to move the cursor to select country, then press "OK" key. Now a password is needed, press the up key and down key to modify the password, and press the right key and left key to move the cursor. Enter the password and then press "OK" key to confirm the selection. Then it will return to the standard interface automatically.

> **Note**
>
> When setting grid-tied country and PV array connection type or recovering Factory Set, please enter the password 000111.

5.3.2 Check the PV array connection type

Enter setup interface by the same way as how to check the local country setting.
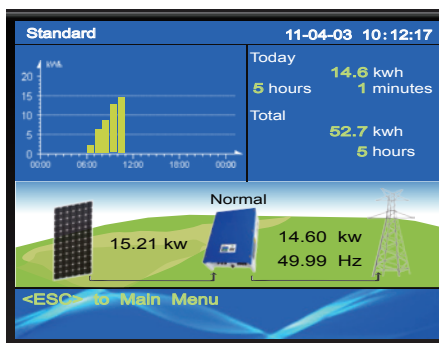
Figure 20 Standard interface

In the standard interface press ESC button then enter the main menu, as shown in figure 21.

Figure 21 Main menu

Press the down arrow key to move the cursor to the" Settings" and then press "OK" key to enter setup interface, as shown in figure 22.

Figure 22 Setup interface

Press the down arrow key to move the cursor to the" Input", then press "OK" key to enter input setting, as shown in figure 23.
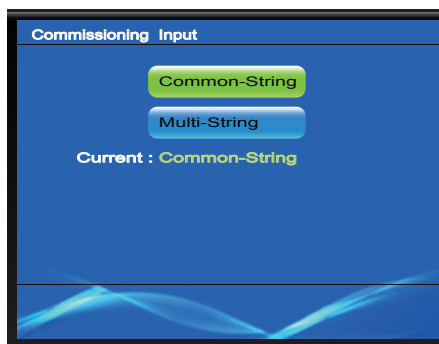
Figure 23 Type of PV array connection

Check whether the current PV array connection type is correct. Please refer to section 4.7.2" PV array connection types " to distinguish type of PV array connection.

If it is correct, press"ESC" to return to the standard interface.

If it is not correct, press the up, down arrow key to move the cursor to select right type, then press "OK" key. Now asked to enter a password, press the up key and down key to modify the password, press the right key and left key to move the cursor . Enter the password and confirm the selection. Then it will return to the standard interface automatically.

6 Operation

6.1 Control and Display Panel(figure 24)
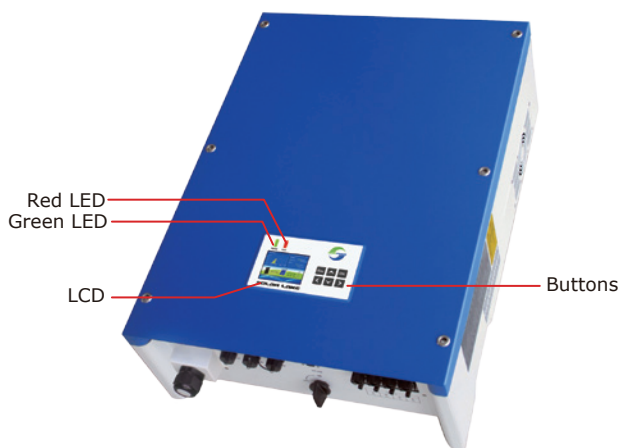
Figure 24 Display and control panel

There are 6 buttons:**OK, ESC, UP, DOWN, RIGHT, LEFT.**

OK button: confirm the selection.

ESC button: exit current screen or selection

UP button: move cursor to up selection or increase the values

DOWN button: move cursor to down or decrease the values.

RIGHT button: move cursor to right side or increase the backlight.

LEFT button: move cursor to left side or decrease the backlight.
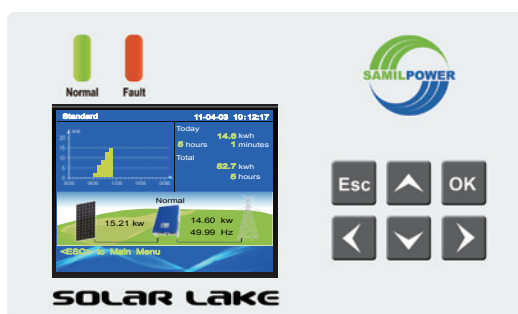
Figure 25 HMI Interface

There are two LEDS on the panel. Different LED status means inverter different working statutes.

Table 5 LED statutes

LED	OFF	FLASH	ON
GREEN LED	Fault or Permanent state or appear unrecoverable serious fault	Wait or Check state, not appear unrecoverable serious fault	Normal state, not appear unrecoverable serious fault
RED LED	No fault	Appear recoverable fault	Appear unrecoverable serious fault

Wait State: Inverter is waiting to CheckState until the end of reconnection time. In this state, the PV voltage is more than 250V and grid voltage value is between the max and min limit; Otherwise, Inverter will go to FaultState or PermanentState.

Check State: Inverter will check isolation resistor, relays, and other safety requirements. It will also do self-test to ensure inverter software and hardwareare functional. Inverter will go to FaultState or PermanentState if any error or fault occurs.

Normal State: Inverter feeds to grid energy from PV panel as much as possible according MPP trackers. Inverter will go to FaultState or PermernentState if any error or fault occurs.

Fault State: Inverter has occurred some recoverable error. It can recover if the errors disappear. If FaultState exist continually, you should check the inverter according error code in table 6,7,8,9,10.

Permanent State: Inverter has occurred some unrecoverable error. It will stay in PermenentState. You should take some measure according the error code.

6.2 LCD settings

6.2.1 Standard interface

Enter the standard interface after starting up, as shown in figure 26.
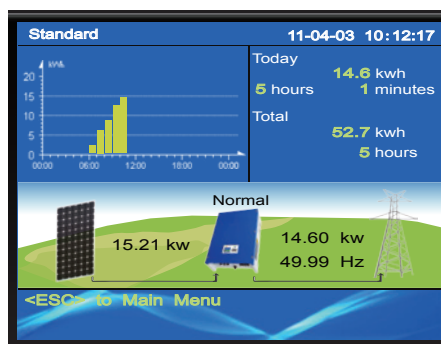
Figure 26 Standard interface

6.2.2 Main menu

In the standard interface press "ESC" button then enter the main menu. Main menu is as shown in figure 27.
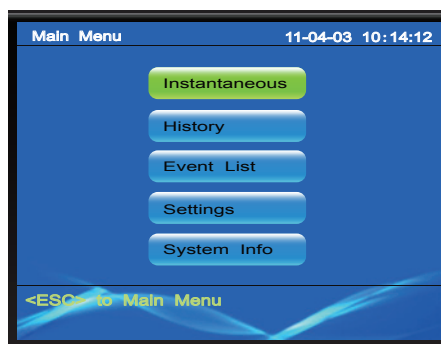
Figure 27 Main menu

6.2.3 Instantaneous data

Move the cursor to the" Instantaneous" and then press "OK", the user will see the input, output voltage, current, power, temperature, insulation and other real-time information.

6.2.4 Historical data

Move the cursor to the" History" and then press "OK", the user will see the power amount histogram of every hour. The user press the left or right arrow key to see the DC input power curve, the AC output power curve, daily electricenergy production histogram in the current month, mensal electricenergy production histogram in the current in the current year and the the annual power generation column in recent 20 years.

6.2.5 Event list

Move the cursor to the" Event List" and then press "OK", the user will see the list of events of inverter. Record 100 event information at most. Press the up or down keys to select events, and press "OK" to get the details of the event, including the occurrence time, error code. Press the ESC button to return to the superior interface progressively.

6.2.6 Settings

Move the cursor to the" Settings" and then press "OK", the user will enter the setting interface, as shown in figure 28. Press up, down, left or right to select options, and then press "OK" to enter the option.

Figure 28 Setting interface

Note:

If the user wants to reset the Country (grid located), input (PV array connection type) or Factory Set (restore factory settings), need to input password to enter the option. Please enter the password 000111.

6.2.6.1 Setting of grid-tied country

Steps of grid-tied country settings refer to "5.3.1 Check grid-tied country setting".

6.2.6.2 Type of PV array connection

Steps of type of PV array connection settings refer to "5.3.2 Check the PV array connection type".

6.2.6.3 Restore factory settings and enable settings

If the user select Factory Set (restore factory settings) in figure 28. System will ask whether to do this setting. If you want to give up, press "ESC". If you press "OK", inverter will clear the power record, record events, settings of grid-tied country and type of PV array connection after the user input password. Press right or left arrow key to select the position of figure and press up or down arrow key to adjust figure when inputting password. Inverter will prompt the (OK) to start commissioning. Now the user press "OK" and then set the inverter parameters. The display will display enable interface, as shown in figure 29.
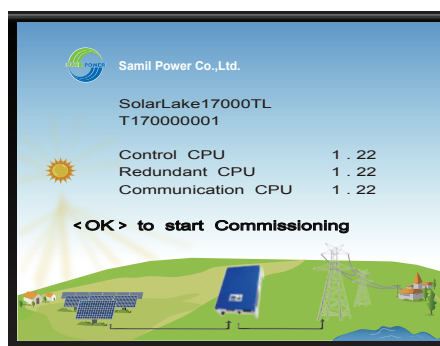
Figure 29 Enable interface

Step 1: Language setting

Press "OK" key to enable settings, and will enter Language setting interface. Press up or down arrow keys to select the corresponding language, and then press "OK" to confirm the selection. Then, press "OK" to enter the next step, as shown in figure 30.

Figure 30 Language setting

Note:

Language settings is unrelated with Grid-tied country settings.

Setp2：Grid-tied country setting

Next interface is grid-tied country setting interface, as shown in figure 31. Different countries have different grid safety rules. Press the up arrow key, down, left or right arrow key to select corresponding country, and then press "OK" to confirm the selection. Then, press "OK" key to enter the next step.

Figure 31 Grid-tied country setting

Step3：Setting of PV array connection type

Next interface is PV array connection type interface, as shown in figure 32. The user should select input connection type correctly according to the actual situation. Press up or down arrow keys to select, and then press "OK" to confirm. Then, press "OK" key to enter the next step.
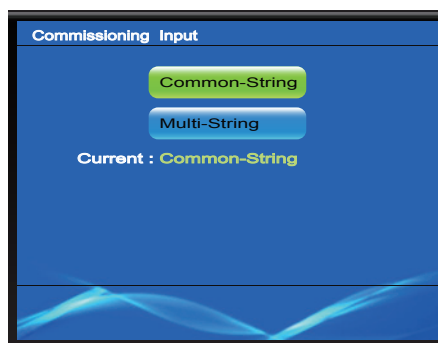
Figure 32 Setting of PV array connection type

Step 4：Date and time settings

Date and time settings interface as shown in figure 33, set according to the local date and time. Press left or right arrow key to move the cursor, press the up or down arrow keys to change value, then press "OK" to confirm the selection.Display time in the upper right corner of LCD. Then, press "OK" key to enter the next step.

Note:

Inverter will check whether the setting is legitimate when changing the time automatically, and prevent illegal time value. If find be unable to modify time, please check whether it is legitimate.
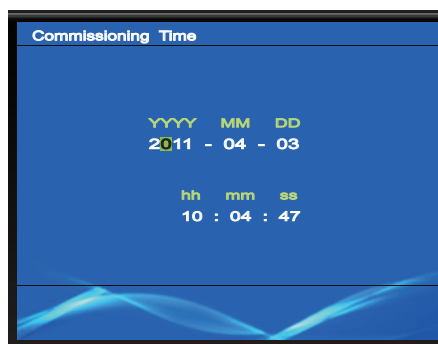
Figure 33 Date and time settings

Step 5：Check boot settings information

LCD will display the settings information. Please check the settings information. If settings is wrong, please press the "ESC" key to reset. If all the information is correct, please press "OK" to confirm, the inverter will save all the settings. As shown in figure 34.
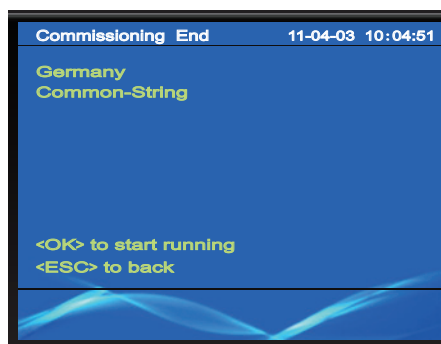
Figure 34 Check boot settings information

6.2.6.4 Autotest procedure- Italy only

Only country setting is Italy during commissioning, Enter main menu then enter setting sub-menu, select AutoTestIta. to run, an automatic test of the inverter will initialed by software, user can get the information via the LCD.(Main menu→Settings→AutoTestIta.) See figure 35.

Figure 35 Autotest selection for Italy only

Make sure during commissioning the country is Italy, then inverter can do self-test automatically follow above instructions.

Operate a new AutoTest procedure

1. Before performing the AutoTest, confirm the country setting is "Italy" and the inverter is running in normal state.

2. On the display Main Menu find (Settings→ AutoTestIta.) and press OK, then select "New Autotest" , press OK , the LCD will be cleared, wait a few seconds, and you can see "(OK) to start Grid R V_max" on the LCD.

3. Press OK button to start grid R V_max test, or press ESC button to exit from "New Autotest". If there is no button operation within 5 seconds, the test will start automatically. If the test has started, key operation is invalid until test is over.

4. After grid R V_max test is over, the LCD will show the result and "(OK) to start V_min", and the inverter will reconnect automatically.

5. Then press OK button to start grid R V_min test. Alternatively press ESC button to exit from "New Autotest". If there is no button operation within 5 seconds, the test will start automatically. If the test has started, key operation is invalid until test is over.

6. After grid R V_min test is over, the LCD will show the result and "(OK) to start F_max" , and the inverter will reconnect automatically.

7. Then, press OK button to start grid R F_max test. Alternatively press ESC button to exit from "New Autotest". If there is no button operation within 5 seconds, the test will start automatically. If the test has started, key operation is invalid untill this test is over.

8. After grid R F_max test is over, the LCD will show the result and "(OK) to start F_min" , and the inverter will reconnect automatically.

9. Then, press OK button to start grid R F_min test. Alternatively press ESC button to exit from "New Autotest". If there is no button operation within 5 seconds, the test will start automatically. If the test has started, key operation is invalid untill this test is over.

10. After grid R F_min test is over, the LCD will show the result and "(OK) to start Grid S V_max" , and the inverter will reconnect automatically.

11. Then, press OK button to start grid S V_max test. Alternatively press ESC button to exit from "New Autotest". If there is no button operation within 5 seconds, the test will start automatically. If the test has started, key operation is invalid untill this test is over.

12. After grid S V_max test is over, the LCD will show the result and "(OK) to start V_min", and the inverter will reconnect automatically.

13. Then, press OK button to start grid S V_min test. Alternatively press ESC button to exit from "New Autotest". If there is no button operation within 5 seconds, the test will start automatically. If the test has started, key operation is invalid untill this test is over.

14. After grid S V_min test is over, the LCD will show the result and "(OK) to start F_max", and the inverter will reconnect automatically.

15. Then, press OK button to start grid S F_max test. Alternatively press ESC button to exit from "New Autotest". If there is no button operation within 5 seconds, the test will start automatically. If the test has started, key operation is invalid untill this test is over.

16. After grid S F_max test is over, the LCD will show the result and "(OK) to start F_min", and the inverter will reconnect automatically.

17. Then, press OK button to start grid S F_min test. Alternatively press ESC button to exit from "New Autotest". If there is no button operation within 5 seconds, the test will start automatically. If the test has started, key operation is invalid untill this test is over.

18. After grid S F_min test is over, the LCD will show the result and "(OK) to start Grid T V_max", and the inverter will reconnect automatically.

19. Then, press OK button to start grid T V_max test. Alternatively press ESC button to exit from "New Autotest". If there is no button operation within 5 seconds, the test will start automatically. If the test has started, key operation is invalid untill this test is over.

20. After grid T V_max test is over, the LCD will show the result and "(OK) to start V_min", and the inverter will reconnect automatically.

21. Then, press OK button to start grid T V_min test. Alternatively press ESC button to exit from "New Autotest". If there is no button operation within 5 seconds, the test will start automatically. If the test has started, key operation is invalid untill this test is over.

22. After grid T V_min test is over, the LCD will show the result and "(OK) to start F_max", and the inverter will reconnect automatically.

23. Then, press OK button to start grid T F_max test. Alternatively press ESC button to exit from "New Autotest". If there is no button operation within 5 seconds, the test will start automatically. If the test has started, key operation is invalid untill this test is over.

24. After grid T F_max test is over, the LCD will show the result and "(OK) to start F_min", and the inverter will reconnect automatically.

25. Then, press OK button to start grid T F_min test. Alternatively press ESC button to exit from "New Autotest". If there is no button operation within 5 seconds, the test will start automatically. If the test has started, key operation is invalid untill this test is over.

26. After grid T F_min test is over, the LCD will show the result and "(Esc) to exit", and the inverter will reconnect automatically.

27. Theautotest function is considered successful once all the previous 12 tests have been performed. When LCD shows "(Esc) to exit", press ESC button to exit from "New Autotest" .

Note:

If an unexpected disconnection requirement occurs during the autotest, the autotest is interrupted. The LCD will show "AutoTest break! (OK) to exit". Press OK button or ESC button to exit from "New Autotest" . Then, disconnect the AC breaker from all 3 phases and prevent it from being reactivated, disconnect the DC switch for 5 minutes and connect it again. The inverter is now in the initialization and you can restart the autotest procedure.

Note:

If user exit from "New Autotest" when any of the previous 12 tests be not performed yet, the inverter will not record any of the test results.

Procedure of viewing AutoTest results from the inverter's LCD

Enter Main Menu, then enter Settings sub-menu, select "AutoTest." and enter it, then select "Last Results" , press OK button, the LCD will show the latest several results' time in terms of a list. The lattest result shows on the top.

Press DOWN or UP button to select one result and press OK button to view the detail. When entering the detail screen, test results of grid R are shown, press RIGHT or LEFT button to view other phases' results. Press ESC button to exit from detail screen.

Procedure of viewing AutoTest results from PC

Note:

After a new AutoTest finished, the results' data will be sent to PC through the RS-232 port between the inverter and PC, one "txt" format report will be created automatically. The detailed operation procedures are as follows:

28. Open the "Enel.exe" file shown in figure 36 in PC(User can download "Enel.exe" application software from www.samilpower.com), one "Report" folder will produced at the same directory with "Enel.exe" file , and each time "txt" format report generated will be stored to the "Report" folder, as shown in Figure 37.

Figure 36

Figure 37

29. elect the corresponding models and communication port(PC and the inverter connection port: com1 ~ com9), as shown in figure 38 and figure 39.
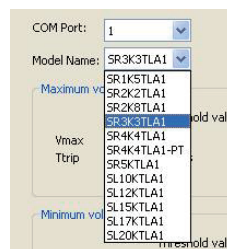
Figure 38

Figure 39

30. Then click "OK" button, "Enel.exe" software automatically reads the inverter's LATEST test data, and generates a "txt" format report, as shown in figure 40 and figure 41.
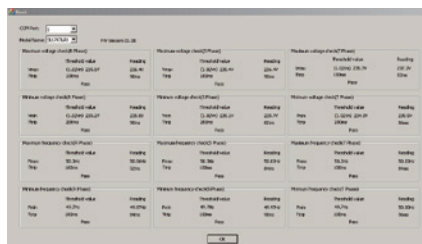
Figure 40
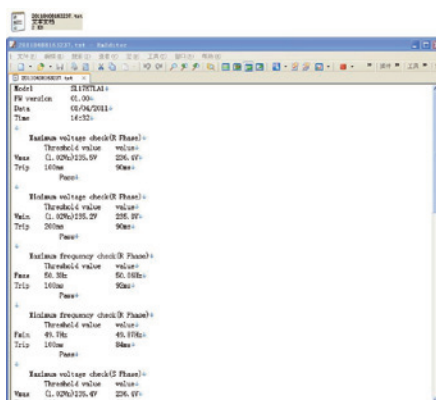
Figure 41

31. If you click "OK" button, one warning message as shown in figure 42 appears, please check the RS-232 communication connection between the Inverter and PC.

Figure 42

In figure 27, press up, down, left or right arrow key to move the cursor to the" System Info" and then press "OK", you will see the machine serial number, software version number and so on. Press "ESC" and will return to the superior interface progressively.

6.3 LCD Function

LCD shows the most of power information user cares. When the inverter operates normally, user touch any button, then the backlight is on, user will see the standard interface.
If none key touching in 60 seconds, the backlight will be off. After that user touch any button, the backlight will be on.

Note that if no operation in 60 seconds, the backlight will goes off. In next 10 seconds if still no operation the screen will back to standard menu, otherwise the backlight will be illuminated.

Note:

After starting inverter and restoring the factory settings, LCD background light will not shut down automatically.

7 Communication and Monitoring

7.1 Communication Interface

This product has a communication interface of RS485（standard），Ethernet/RS232（optional）
Operating information like output voltage, current, frequency, fault information, etc., can be delivered to PC or hardware storage devices or other monitoring equipment via communication interface.

7.2 Communication mode

When user want to know the information of the power station and manage the entire power system. We offer below 3 types communications.

7.2.1 RS232 Communication for standalone type

RS232 is one communication interface. It transmits the data between PC and one single SolarLake series inverters (figure 43). For communication cable, one end is male connector; the other end is female connector.
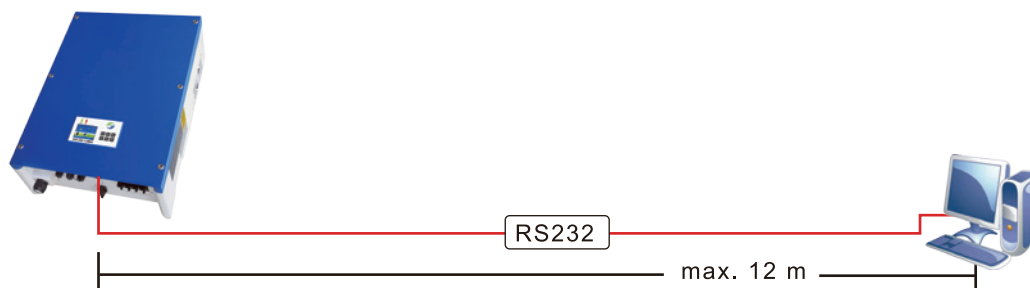
Figure 43 RS232 Communication Diagram

One inverter can only be communicated with one PC at the same time through RS232 port. Thus this method is generally used for single inverter's communication, for examples，software updating and serviceman's testing.

7.2.2 RS485 Communication for Several inverters

RS485 is generally for multiple inverters' communication. Up to 32 inverters could communicate at the same time, but wire length should be≤1200m. SolarPower Manager can be used for monitoring multiple inverters at the same time. Users can browser the PV plants operating data collected by SolarPower Manager through PC. Connecting the system as blow (figure44), user can easily monitoring the PV power station.
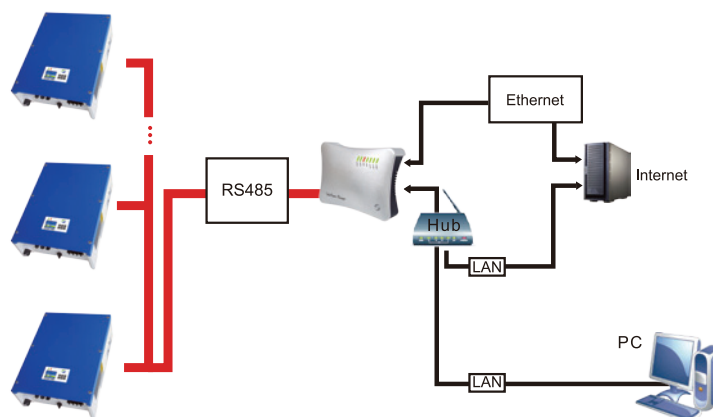
Figure 44 SolarPower Manager Monitoring Diagram

Two types of cable must be prepared when using SolarPower Manager for monitoring multipleinverters.

The communication cable between inverter and inverter:

1. Prepare two 8-PIN RJ45 connectors, to hold the RJ45 connector with the 'clip' on the bottom. To have to the 'opening' (where you insert the cable) facing you, the order number is 1 to 8 from left to right.

2. Use a length of communication cable, then push the 8 color wires into the modular plug follow the same order as shown below.

1	Green
2	Green white
3	Blue
4	Orange white
5	Orange
6	Blue white
7	Brown white
8	Brown

3. Then put the both ends of communication cable into the communication ports of inverter respectively. If there are N inverters, need N-1 this communication cable.

The communication cable between inverter and SolarPower Manager:

1. Prepare one 8-PIN RJ45 connector and one 4-PIN RJ11 connector. To hold the RJ45 connector with the 'clip' on the bottom. To have to the 'opening' (where you insert the cable) facing you. The order number is 1 to 8 from left to right of 8-PIN RJ45 connector, the order number is 1 to 4 from left to right of 4-PIN RJ11 connector.

2. Use a length of communication cable, then push the wires into the connector follow the same order as shown below.

1	Green
2	Green white
3	Blue
4	Orange white
5	Orange
6	Blue white
7	Brown white
8	Brown

1	Blue white
2	Blue
3	Green white
4	Green

3. Put the 4-PIN RJ11 connector into the SAMIL COM of SolarPower Manager, put the 8-PIN RJ45 connector into the first or the last one of inverters.

Please see Installation Guide of SolarPower Manager for more information.

Note：

If you want to use SolarPower Manager to monitor numerous SolarLake inverters, every inverter must have two RJ45 modular jack for RS485. Under the default configuration, COM1 port on inverter is for ethernet, COM2、COM3 port on inverter is for RS485.

7.2.3   Ethernet communication

User can connect inverter with the router (the router is not special for inverters, user can get any brand in the market.) according to the requirements, then user can check the inverter's data in any place of the world.
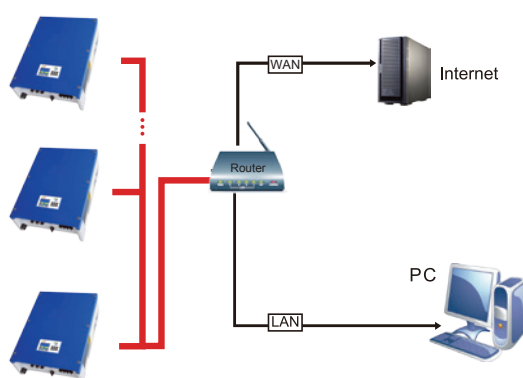
Figure 45 Ethernet communication

Hardware Requirements: Support only windows operating system, includingxp,vista,win7.

Network interface for inverter: COM1.

Monitor mode: LAN and WAN.

L**AN:** Install SolarPower Browser（Not less than v2.3） in the PC which can monitor inverters .In this mode, you can use a router or nonuse.

If you use a router, you can monitor 254 inverters.

Parameter setting for router:

Step 1：Enter standard interface automatically after startup (If not the standard interface, press "ESC" return to the standard interface), as shown in figure 46.
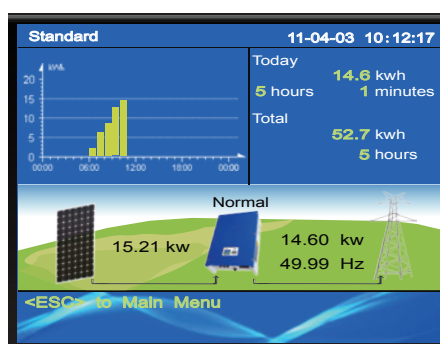
Figure 46 Standard interface

Step 2: Press "ESC" in standard interface then enter the main menu, as shown in figure 47.

Figure 47 Main menu

Step 3: Move the cursor to the" settings" and then press "OK", will enter settings interface, as shown in figure 48.

Figure 48 Settings interface

Step 4: Move the cursor to the" Communication" and then press "OK", will enter IP settings interface, as shown in figure 49.
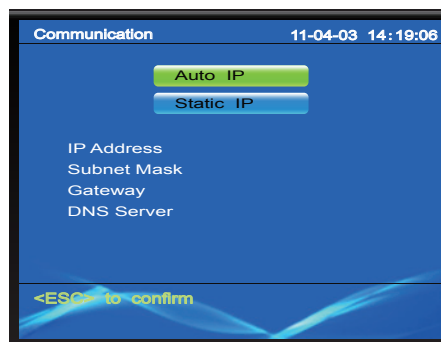
Figure 49 IP settings interface

Step 5: Move the cursor to the" Auto IP" and then press "OK". Inverter will prompt user to conform Auto IP and press "OK". Now setting is over. Rebooting LCD then enter standard interface automatically.

If you don't use a router, you can only monitor 1 inverter. Need to use cable to connect inverter with PC.

Parameter setting for nonuse router:

Step 1: Enter standard interface automatically after startup (If not the standard interface, press "ESC" with proper times return to the standard interface return to the standard interface), as shown in figure 50.
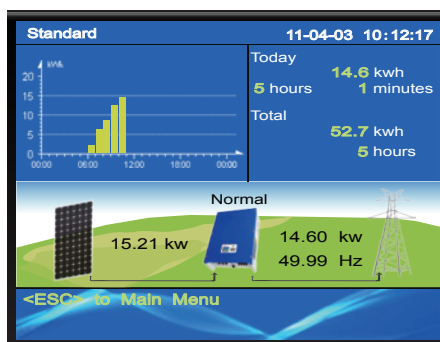
Figure 50 Standard interface

Step 2: Press "ESC" in standard interface then enter the main menu, as shown in figure 51.
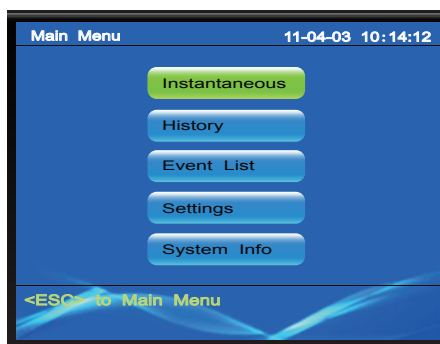
Figure 51 Main menu

Step 3: Move the cursor to the" settings" and then press "OK", will enter settings interface, as shown in figure 52.

Figure 52 Settings interface

Step 4: Move the cursor to the" Communication" and then press "OK", will enter IP settings interface, as shown in figure 53.

Figure 53 IP settings interface

Step 5: Move the cursor to the" Static IP" and then press "OK", as shown in figure 54. Now the cursor stop at the first figure. Press right or left arrow key to move the cursor to select the figure which need to be modified. Press up or down arrow key to modify figure（IP Address：192.168.000.002、Subnet Mask：255.255.255.000, the others are 0, as shown in figure 54）. Press "OK" after modifying. LCD will display the setting parameter and press "OK" again, setting is over. LCD interface will Reboot and then enter into standard interface automatically.
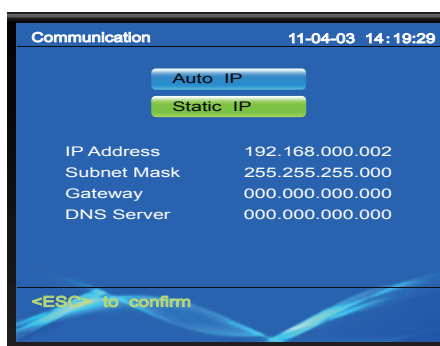
Figure 54 IP settings interface

Parameter set for PC:
Set IP address as 192.168.000.001,
Set Subnet mask as 255.255.255.000.

Note

① Need to install SolarLake Inverter Monitoring software in the PC when using RS232, Ethernet communication.

② Can't using RS232, RS485 and Ethernet communication mode for a PC at the same time.

③ The default set is "Auto IP". If router is used, LAN or WAN monitor is ok without any setting.

④ In WAN mode, router is necessary and auto IP mode should be selected.

⑤ WAN is not applicable by now.

8 Troubleshooting

8.1 Troubleshooting

This section contains information and procedures for solving possible problems with the SolarLake series inverters, and provides user with troubleshooting tips to identify and solve most problems that could occur with the SolarLake series inverters.

This section will help user narrow down the source of any problems user may encounter. Please read the following troubleshooting steps.

1. Check thewarning or fault messages on the System Control Panel or Fault codes on the inverter information panel. If a message is displayed, record it before doing anything further.
2. Attempt the solution indicated in table 6 ,7,8,9,10.
3. If inverter information panel is not displaying a Fault light, check the following list to make sure that the present state of the installation allows proper operation of the unit.

   — Is the inverter located in a clean, dry, adequately ventilated place

   — Have the DC input breakers been opened

   — Are the cables adequately sized and short enough

   — Are the input and output connections and wiring in good condition

   — Are the configurations settings correct for user particular installation

   —Are the display panel and the communications cable properly connected and undamaged

Contact Samil Power Customer Service for further assistance. Please be prepared to describe details of user system installation and provide the model and serial number of the unit.

View the warning on screen and the steps of false information:
Press "ESC" then enter the main menu in the normal interface. In the interface press "downward" and select "Event List", then press "OK" to enter events list shown as figure 55.

Figure 55 Events list

When SolarLake Inverter is at fault, the fault information is composed of "group+code" displayed on LCD. There 3 kinds of faults(Grid、PV and Inverter). One code indicates one fault. For example "Grid 3" indicates under voltage L2 phase. Another type of fault is for user, recording modify settings by user.

In the events list display the type of event, code, occurring time and current status.

Press the right or to the left key can flip and press upward or downward key move the cursor. Press "OK" key can view the details of selected event, shown as figure 56.
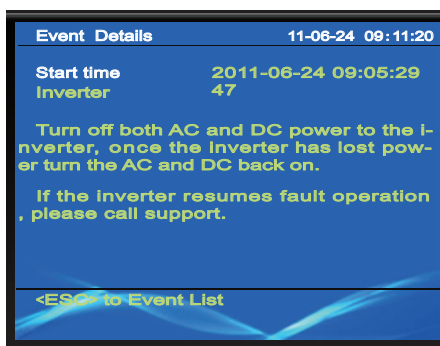
Figure 56 Event Details

In the event details shows event type, code, occurring time and operation hints.

Please contact Samil Power Co.,Ltdforfurthertechnical assistance.Please provide detailed installation information and inverter model, serial number and fault information to get optimal solution.

Table 6 Error code list of AC grid

Group	Code	Fault description	Suggestion operation and Solutions
Grid	0	L1 phase over-voltage	① Check whether AC grid(voltage and frequency) is beyond the scope; ② Check whether the connection of AC side is correct; ③ If still at fault, please ask for help.
	1	L1 phase under-voltage	
	2	L2 phase over-voltage	
	3	L2 phase under-voltage	
	4	L3 phase over-voltage	
	5	L3 phase under-voltage	
	6	Over-frequency	
	7	Under-frequency	
	8	DC component of L1 phase is too large	
	9	DC component of L2 phase is too large	
	10	DC component of L3 phase is too large	
	11	L1 phase over- frequency	
	12	L1 phase under- frequency	
	13	L2phase over- frequency	
	14	L2phase under- frequency	
	15	L3 phase over- frequency	
	16	L3 phase under- frequency	

Table 7 Error code list of DC side

Group	Code	Fault description	Suggestion operation and Solutions
PV	0	DC side PV1 over-voltage (input mode: Multi-String)	① Check whether the output voltage of PV array is in the allowing range. ② Check whether the insulation of PV cable is good; ③ Inspect whether the installation is correct according to the manual. ④ If still at fault, please ask for help.
	1	DC side PV2 over-voltage (input mode: Multi-String)	
	2	DC side under-voltage (input mode: Common-String)	
	3	DC side over-voltage (input mode: Common-String)	
	4	PV1 insulation impedance error	
	5	PV2 insulation impedance reeor	
	6	Insulation impedance protects power source auxiliary	
	7	Input current is not balanced. (input mode: Common-String)	
	8	Leakage current error	
	9	30 mA jumping error	
	10	60 mA jumping error	
	11	150 mA jumping error	
	12	Leakage current more than 300 mA	

Table 8 Error code list of inverter

Group	Code	Fault description	Suggestion operation and Solutions
Inverter	0	Start working	Without any remedy
	1	Electrify communication board	
	2	Electrify control board	
	3	Blackout of control board	
	4	Read clock of communication board error	Ask for help if still at fault after rebooting.
	5	Write clock of communication board error	
	6	Read communication board EEPROM error	
	7	Write communication board EEPROM error	
	8	Communicate between control board communication board error	
	9~29		
	30	CPU Communication between main control board and subordinate control board error	Without any remedy
	31	Main control board and subordinate control board error	
	32	Auxiliary power source error	
	33	High temperature protection	

Continued：

	34	Phase locking error	
Wechsel richter	35	Bus under-voltage	Without any remedy
	36	Bus over-voltage	
	37	Bus voltage unbalanced	
	38	Bus Hardware over-voltage protection (restore)	
	39	Output hardware over-current protection (restore)	
	40	Boost hardware over-current protection	
	41	Over-current of output(RMS)	
	42	Choose input mode error	Check whether the collection of PV array is the same with setting
	43	Self- checking error	Ask for help if still at fault after rebooting.
	44	Phase of output error	Check electricity wiring after power off. Ask for help if still at fault
	45	AD port using to gathering output voltage error	Ask for help if still at fault after rebooting.
	46	AD port using to gathering output current error	
	47	AD port using to gathering DCI error	
	48	AD port using to gathering GFCI error	
	49	IAC_RMS_Unbalance	Without any remedy
	50	The output hardware over-current protection (not resume)	Ask for help if still at fault after rebooting.
	51	Bus hardware over-voltage protection (not resume)	
	52	Boost1 over-current protection	
	53	Boost2 over-current protection	
	54	Output over-current (instantaneous date) (not resume)	
	55	Relay can't be disconnect	
	56	Relay can't be closed	
	57	Unrecoveriac_rms_unbalance	

Continued：

	Code	Description	Suggestion operation and Solutions
	58	Fan 1 error	Check the fan. If not turn, contact to exchange.
	59	Fan 2 error	
	60	Fan 3 error	
	61	Control board EEPROM read and write error	Ask for help if still at fault after rebooting.

Table 9 User operation accord

Group	Code	Description	Suggestion operation and Solutions
User	0	Start serial upgrade program	Without any remedy
	1	Modify the language	
	2	Modify the time	
	3	Modify the country	
	4	Modify the input method	
	5	Clean up the production records	
	6	Clean up event record	
	7	Restore factory settings	
	8	Modify the LCD brightness	
	9	Modified the LCD time	
	10	Modified the network Settings	

Table 10 Other error

Group	Code	Description	Suggestion operation and Solutions
Other error	0	LCD displays waiting at all times	Ask for help if still at fault after rebooting.

Note:

"Without any remedy" means that the event is not error, or inverter will resume from error automatically.

8.2 Daily maintenance

Inverters generally do not need any maintenance or correction, but need to ensure cooling fan not be covered by any dust or dirties.

● **Inverter cleaning**
Please use electric compressing dryer, soft dry cloth or brush to clean inverters. Water, corrosive chemical substance or intense cleaning agent is not allowed to clean the cooling fan.

● **Cooling fin cleaning**
To ensure inverter performance and long-period usage, back heat emitter needs to be left with available space, side fan cannot be covered with dust or snow as it will affect airflow. Please use compressing air, soft cloth or brush to clean cooling fin, not water, corrosive chemical substance or intense cleaning agent.

9 Decommissioning

9.1 Decommissioning steps

- Switch off the AC grid
- Switch Off the DC switch
- Wait for 5 minutes
- Release the DC connectors
- Release the AC terminals via screw drivers.

Now inverters can be demounted in a safe way.

9.2 Package

If possible, please pack the inverter with the original packaging. If it is no longer available, user can also use an equivalent carton that meets the following requirements: Suitable for loads more than 50 kg; With handle; Can be fully closed.

9.3 Storage

Store the inverter in dry place where ambient temperatures are always between -25 °C - +70 °C.

9.4 Disposal

Please be sure to deliver inverters at the end of its service and packing materials to certain site (it should apply disposal regulations for electronic scrap), where can assist relevant department to dispose and recycle.

10 Technical Data

10.1 Input (DC)

Model	SolarLake 10000TL	SolarLake 12000TL	SolarLake 15000TL	SolarLake 17000TL
Max. recommended DC power [W]	10400	12500	15600	17700
Max.DC voltage [V]	1000	1000	1000	1000
Total max. input Current [A]	A:16/B:16	A:16/B:16	A:20/B:20	A:20/B:20
Number of MPP trackers / strings per MPP tracker	2/2	2/2	2/2	2/2
MPPT voltage range (at full power) [V]	320~800	380~800	380~800	430~800
Min. DC voltage / start voltage [V]	160/210	160/210	160/210	160/210

10.2 Output (AC)

Model	SolarLake 10000TL	SolarLake 12000TL	SolarLake 15000TL	SolarLake 17000TL
AC nominal power [W]	10000	12000	15000	17000
Max. AC power [W]	10000	12000	15000	17000
Max. AC current [A]	16	19.2	24	25
Nominal AC voltage [V]	3/N/PE, 230/400	3/N/PE, 230/400	3/N/PE, 230/400	3/N/PE, 230/400
AC grid freq. [Hz]	50	50	50	50
Power factor(cos)	0.9leading……. 0.9lagging	0.9leading……. 0.9lagging	0.9leading……. 0.9lagging	0.9leading……. 0.9lagging
Total harmonic distortion (THD)	<3%	<3%	<3%	<3%

10.3 Efficiency, Safety and Protection

Model	SolarLake 10000TL	SolarLake 12000TL	SolarLake 15000TL	SolarLake 17000TL
Max. efficiency	97.9%	97.9%	98.0%	98.0%
Euro- efficiency	97.4%	97.4%	97.6%	97.6%
MPPT efficiency	99.9%	99.9%	99.9%	99.9%
Overvoltage / Undervoltage protection	Yes	Yes	Yes	Yes
DC isolation impedance monitoring	Yes	Yes	Yes	Yes
Ground fault protection	Yes	Yes	Yes	Yes
Grid monitoring	Yes	Yes	Yes	Yes
Ground fault current monitoring	Yes	Yes	Yes	Yes
DC injection monitoring	Yes	Yes	Yes	Yes

10.4 General Data

Model	SolarLake 10000TL	SolarLake 12000TL	SolarLake 15000TL	SolarLake 17000TL
Dimension (W/H/D) [mm]	520*716*230	520*716*230	520*716*230	520*716*230
Weight [kg]	50	50	50	50
Cooling concept	Fan			
Noise emission (typical) [dB]	<47	<47	<47	<47
Operating temperature range [°C]	-20 °C ～ +60 （Derating at 45 °C）			
Degree of protection	IP65			
Pollution Degree	II			
Topology	Transformerless			
Internal consumption (night) [W]	<5	<5	<5	<5
LCD display	3.5Inch, TFT-LCD	3.5Inch, TFT-LCD	3.5Inch, TFT-LCD	3.5Inch, TFT-LCD

Continued:

Communication interfaces	Ethernet/ RS232/ RS485	Ethernet/ RS232/ RS485	Ethernet/ RS232/ RS485	Ethernet/ RS232/ RS485
Standard warranty(Year)	5	5	5	5

11 Manufacture warranty and liability clauses

Samil Power Co., Ltd offers 5 years warranty service for SolarLake inverter. Warranty period is from the date of installation. But the longest period don't exceed 66 months from the date of delivering goods.

During the warranty period, Samil Power Co., Ltd guarantees normal function of the SolarLake inverter. If there are faults within our responsibility, we will provide maintenance free of charge. During the warranty period, if inverter appears malfunction or fault, please contact your dealer or installation contractor.

The followings are not included in the scope of warranty:

- Use SolarLake inverter for other purpose;
- Install incorrectly or not conform to the rule;
- Improper operation
- Useunqualified protection when working;
- Modify the equipment without authority;
- Damage because of external factors or the majeure force(such as lightning, over-voltage, bad weather, and fire, earthquake, tsunami and so on);
- Poor ventilation;
- Don't comply with the relevant safety regulations;
- Transportation damage.

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